SOV/56-12-7-10/52

AUTHORS: Aron, P. M., Kalyamin, A. V., Murin, A. N., Yakovlev, V. A.

TITLE: On New Rare Earth Isotopes With N-utron Deficit. Lutetium Isotope With the Mass Number 167 (O novykh neytronodefitsitnykh izotopakh redkikh zemel'. I otop lyutetsiya s massovym chislom 167)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958, Vol. 22, Nr 7, pp. 817 - 817 (USSR)

ABSTRACT: When tantalum was bombarded with 660 MeV protons in the synchrocyclotron of the OIYaI rare earth isotopes with a neutron deficit were produced. Some of them have not been known hitherto (Refs 1 - 3). A radioactive nuclide with a half-life of 55 + 3 minutes was discovered in the chromatographic separation of the lutetium fraction. The half-life was obtained from the intensity curve of γ-lines at ~ 100 keV, which was recorded by a γ-scintillation spectrometer. When ytterbium is separated by chromatographic methods 7 hours after the active rare earths had been separated from the lutetium fraction, the

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same line is found. The intensity of this line in the ytterbium fraction dropped with a half-life of 18 minutes. The energies of the γ-quanta and the half-lifes within experimental errors correspond to the tabled data for Yb^{167} ($T_{1/2}$=18 minutes, E_γ = 118 keV). The thulium fraction separated simultaneously with ytterbium from the lutetium fraction emitted the characteristic γ-spectrum of Tu^{167}. The intensity of the bright γ-line with an energy of E_γ = 207 keV decreases with a half-life of 9,6 days. Hence, the existence of the hitherto unknown isotope Lu^{167} is proved:

$$Lu^{167} \xrightarrow{E} Yb^{167} \xrightarrow{E} Tu^{167} \xrightarrow{E} Er^{167}$$

$T_{1/2}$ = 55 min $T_{1/2}$ = 18 min $T_{1/2}$=9,6 days (stable)

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On New Rare Earth Isotopes With Neutron Deficit. SOV/48-22-7-10/26
Lutetium Isotope With the Mass Number 167

Apart from the γ-line with an energy of ~100 keV, also lines with an energy of ~170 keV and ~240 keV were found in the spectrum of the initially separated lutetium fraction. The ~170 keV-line was also observed in the spectrum of the daughter ytterbium. Its half-life is near to that of Yb^{167}. The ~240 keV-line was not observed in the spectrum of the daughter ytterbium, as it originates from Lu^{167}. V. P. Dzhelepov, Director of the Laboratory for Nuclear Problems OIYaI, the operational staff of the synchrocyclotron, and B. K. Preobrazhenskiy assisted in the first experiments. There are 3 references, 3 of which are Soviet.

ASSOCIATION: Radiyevyy institut im. V.G. Khlopina Akademii nauk SSSR. (Radium-Institut imeni V.G. Khlopin, AS USSR)

Card 3/4

SOV/48-22-7-11/26

AUTHORS: Gorodinskiy, G. M., Murin, A. N., Pokrovskiy, V. N., Preobrazhenskiy, B. K.

TITLE: On the Lutetium Isotope With the Mass Number 173 (Ob izotope lyutetsiya s massovym chislom 173)

PERIODICAL: Izvestiya Akademii nauk SSSR, Seriya fizicheskaya, 1958, Vol. 22, Nr 7, pp. 818-820 (USSR)

ABSTRACT: A long-lived Lu-isotope with a half-life $T_{1/2}$ of about 200 days was discovered by the authors among the products of the rare earths obtained from a "thorough" (glubok) fission reaction It was given the mass number 173. (Ref 1). As this half-life does not agree with that of reference 2 for Lu^{173} and as it is near to that of Lu^{174} (165 days) a separation of Lu from Hf was carried out. The lutetium separated from Hf was stored for several months until the short-lived isotopes had decayed almost completely. Then the β-spectra were investigated as well as the β-spectra of the preparation obtained by a chromatographic separation of the sum of radioactive rare

On the Lutetium Isotope With the Mass Number 173

earths. When the necessity arose, the Lu preparations were purified from Yb^{169}. A comparison of the spectra shows that the basic proportion of the activity of long-lived Lu is without doubt caused by only one isotope with a half life of about 200 days. The table of isotopes from reference 2 shows that the only isotope remaining in the preparation separated from Hf is Lu. Thus, the earlier identification by the authors was substantiated. γ-lines with an energy of 345, 570 and 630 keV were discovered in the range of hard γ-radiation of the spectrum of Lu^{173} It is only assumed that the 570 and 630 keV γ-lines originate from the Lu^{173} spectrum. The relative intensities of the γ-lines of Lu^{173} are determined by the following ratio: $\gamma_{79} : \gamma_{101} : \gamma_{175} : \gamma_{274} : \gamma_{345} : \gamma_{570} : \gamma_{630} =$ 1 : 0,52 : 0,425 : 1,85 : 0,0113 : 0,15 : 0,26. In order to check the coincidence of the γ-quanta of Lu^{173} the coincidences of the γ-quanta with an energy of 274, 175 and 79 keV with the other quanta of the spectrum were examined The results are

On the Lutetium Isotope With the Mass Number 173

as follows: The β^--line at 79 keV gives a coincidence with the lines at 101, 175, and 274 keV. The β^--line at 175 keV gives a coincidence with the 101 keV-line and with that of the self-coincidence, which substantiates the composite character of this line. A control experiment checking on the coincidence of the 274 keV-line with the other lines confirmed these statements. Based upon a combined evaluation of the results from reference 3 and of this paper a decay scheme of Lu^{173} is suggested. The low activity of the preparation did not permit to determine the position of the 570 and 630 keV transitions. In the computation of the relative coincidence probability of various γ-quanta of Lu^{173} the aforementioned decay scheme and the known parameters of the measuring equipment for $\beta^- - \gamma$-coincidences are used. The results of the computation and of the experiment well agree with each other. The staff of the Laboratory for Nuclear Problems OIYaI assisted in the work. K. Ya. Gromov and B. S. Dzhelepov discussed the results of the investigation with the authors. There are 4 figures and 3 references, 3 of which are Soviet.

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SOV/48-22-7-11/26

On the Lutetium Isotope With the Mass Number 173

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR
(Radium Institute imeni V. G. Khlopin, AS USSR)

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5(4) SOV/76-32-11-18/32

AUTHORS: Murin, A. N., Lur'ye, B. G.

TITLE: On the Diffusion of the Silver Ions in the Mixed Crystals AgBr + $CdBr_2$ (O diffuzii ionov serebra v smeshannykh kristallakh AgBr + $CdBr_2$)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 11, pp 2575-2579 (USSR)

ABSTRACT: The dependence of the electric conductivity of the mixed crystals AgBr + $CdBr_2$ on the composition is rather complex. It is assumed that the Cd^{2+} ions in the crystal lattice AgBr take the positions of the Ag ions, but that at the same time an equivalent number of lattice positions $Ag_{\square}$ are formed which secure an electric neutrality of the mixed crystal. The migration processes of the interstitial ions can take place in the form of direct (from one position to the other) or "relay" transitions. In pure AgBr the value $\alpha \approx (0.5\text{-}0.6)$ was obtained (Refs 3,4 and 10), which corresponds to two thirds "relay" and one third direct transfers. To determine the coefficients of the autodiffusion of silver ions in AgBr in the case of

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On the Diffusion of the Silver Ions in the Mixed Crystals AgBr + $CdBr_2$

different amounts of the $CdBr_2$ additions (0-6 mol%) the method of sectioning was employed in the present case. The authors used AgJ activated with Ag^{110} in a furnace (Fig 1) at 225°. A minimum observed on the diffusion isotherm is explained by a quasichemical reaction, the "salting out", corresponding to the equation $Ag_{\square} + Ag^{0} \rightleftharpoons Ag^{+}$ (in the lattice). The further increase of the diffusion coefficient with the Cd concentration is explained by an increase of the empty lattice sites in the cationic part of the AgBr lattice. The ratio between the diffusion coefficients calculated from data by Teltow (Tel'tov) according to the Einstein equation (Eynshteyn) and the experimentally obtained values remains constant ($\alpha = 0.67$) (Table) The obtained results tend to show the absence of movable "complex compounds" of the $Cd^{2+}Ag_{\square}$ type. L. M. Belov, Diploma Candidate, took part in the investigations. There are 1 figure, 1 table, and 14 references, 4 of which are Soviet.

ASSOCIATION: Gosudarstvennyy universitet im. A. A. Zhdanova, Leningrad
(State University imeni A. A. Zhdanov, Leningrad)

MURIN, A. N.

MURIN, A.N.

21 (7), 21 (8)

AUTHOR: Rudakov, V. P. SOV/89-[illegible]-18/25

TITLE: IX All-Union Conference on Nuclear Spectroscopy (IX Vsesoyuznoye soveshchaniye po yadernoy spektroskopii)

PERIODICAL: Atomnaya energiya, 1959, Vol 7, Nr [illegible], pp 7[illegible]-79 (USSR)

ABSTRACT: The IX All-Union Conference was held from January 26 to February 2, 1959 at Khar'kov. More than 300 participants heard 100 lectures, the most important of which dealt with the following fields. Nuclear Theory. General problems of β-decay. A. S. Davydov (MGU): Theoretical classification of low-energy excited nuclear states. L. K. Peker: Deformed nuclei. [illegible] Birbrair, L. K. Peker, L. A. Sliv (LFTI): Quadrupole oscillations of deformed nuclei. Ye. V. [illegible], V. [illegible], S. P. Tsytko (KhFTI): Calculation of the ft-values with matrix elements for β-transitions by means of the generalized nuclear model. S. T. Belyayev (IAE): Consideration of pair-correlation in nuclei. A. B. [illegible] (IAE): The application of the superconductivity model to nuclei for the purpose of calculating their moments of inertia. P. E. Nemirovskiy (IAE): Problems of the neutron stability of nuclei. [illegible] (IAE): The present stage in the theory of β-decay. [illegible]

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V. K. Grigor'yev, V. A. [illegible], [illegible] [illegible]: Measurement of the angular correlation between electron and neutrino in the decay of the neutron. V. [illegible], [illegible] Nazarenko, [illegible] (LFTI): Measurement of the correlation between the transversal electron polarization and circular polarization of γ-quanta occurring in the decay of Sc^{46} and Co^{60}. Decay Schemes. γ-radiation of Nuclei. [illegible] Anufriyev, A. K. Val'ter, Yu. V. Gonchar, Ye. [illegible], A. N. L'vov, P. M. Tutakin, S. P. Tsytko, P. V. Sorokin, A. S. Taranko, I. Ya. Malakhov, A. [illegible] (Fiziko-tekhnicheskiy Khar'kovskiy institut (Physico-technical Institute, Khar'kov)): The $Si^{28,29,30}(p,\gamma)$, $Ne^{20}(p,\gamma)$, $S^{32,34}(p,\gamma)$, $Ar^{40}(p,\gamma)$ and $N^{14}(p,\gamma)$ reactions. D. G. Alkhazov, A. P. Grinberg, G. M. [illegible], M. Kh. Lemberg, V. V. Rozhdestvenskiy [illegible] of the Leningradskiy fiziko-tekhnicheskiy institut (Leningrad Physico-technical Institute). Investigation of the [illegible] excitation of the lower levels of some nuclei during their bombardment by multiply charged ions (C, N, O, and Ne). A. V. Kalyamin, A. N. Murin, V. N. Pokrovskiy, V. A. Yakovlev (RIAN): New isotopes $Tu^{16[illegible]}$, Ho^{153}, Ho^{155} and $Ho^{[illegible]}$. B. S. Dzhelepov, [illegible] Sergiyenko (LGU): Decay schemes of some neutron-deficient isotopes, set up on the basis of measurements of the coincidence of the internal conversion electrons. Spectroscopy Engineering. B. S. Dzhelepov, M. E. [illegible], [illegible], V. G. Chumin (RIAN): α-spectrometer with double focusing. S. A. Baranov, [illegible], A. G. Zelenkov, [illegible], G. Ya. Shchepkin (IAE): Improved α-spectrometer [illegible]; Barchuk, G. V. Belykh, V. I. [illegible], [illegible] (IFAN UkrSSR): Magnetic spectrograph for heavy charged particles. The representatives of the Ministerstvo radiotekhnicheskoy promyshlennosti (Ministry of the Radio-engineering Industry) gave a report about new multipliers. The Conference was closed by B. S. Dzhelepov who stressed the fact that nuclear tables and reference works ought to be published much more quickly in order to be of real use to the experimenter.

Card 3/3

MURIN, A.N.; PLINER, Yu.G.

Mechanism of the formation of abnormal mixed crystals. Radiokhimiia 1 no.3:253-256 '59. (MIRA 12:10)
(Crystals--Growth)

5(4) SOV/20-127-5-34/58

AUTHORS: Murin, A. N., Lur'ye, B. G., Shapkin, G. N.

TITLE: On the Transfer Heats of the Complexes $[Cd^{++}Ag^{\square}]$ in $AgBr+CdBr_2$-Crystals

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 5, pp 1055-1057 (USSR)

ABSTRACT: In a solid solution of cadmium bromide in silver bromide Cd^{++}-ions take the place of Ag^{+}-ions in the crystal lattice of AgBr under production of $Ag^{\square}$-cation vacancies. The reaction between Cd^{++} (with an excess charge +e) and the vacancies $Ag^{\square}$ (excess charge -e) leads to the association of neutral complexes of the form $[Cd^{++}Ag^{\square}]$. If a temperature gradient becomes effective in the system AgBr + $CdBr_2$, a thermodiffusion of cadmium occurs, the Cd-ions moving only as a complex $[Cd^{++}Ag^{\square}]$. In the steady state the relative concentration $\Delta C/C$ is described by the equation (Ref 2): $\frac{\Delta C}{C} = \frac{-(1+p)Q_k^* + (1-p)\chi}{2kT^2}\Delta T$ (T - temperature difference between the cold and the hot end of the sample;

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On the Transfer Heats of the Complexes $[Cd^{++}Ag^{\square}]$ in $AgBr+CdBr_2$-Crystals

Q_k^* - transfer heat of the complex $[Cd^{++}Ag^{\square}]$, χ = association heat of the complex according to reference 3 0.16 ev). $\Delta C/C$ was measured. A finely dispersed mixture of AgBr and $CdBr_2$, marked by Cd^{115m}, was pressed into tablets under a pressure of 4000 at. The said tablets were homogenized by annealing, and were then heated in a furnace with constant temperature gradient for 315 hours, batches of 5 tablets being separated by mica plates; the temperature difference between the hot and the cold end of the furnace amounted to 100° (210-310°), so that a temperature difference of 20° corresponded to each tablet. Figure 1 shows the linear dependence of $\lg C/C_0$ on $1/T$ (C_0 - concentration of cadmium before the experiment). In the case of the mentioned duration of the experiment, only the tablet at the hot end attained the equilibrium concentration, although the diffusion coefficient calculated by other authors (Ref 7) made it appear probable that equilibrium concentration would be attained by all 5 tablets. An experimental determination of the diffusion coefficient proved, however, that the data of reference 7 are too high by one order of magnitude,

On the Transfer Heats of the Complexes $[Cd^{++}Ag^{\square}]$ in $AgBr+CdBr_2$-Crystals

and that the duration of the experiment actually sufficed only for the temperature interval of 310-290° in order to attain equilibrium concentration. $Q_k^{\#}$ was calculated as amounting to -0.54 ev. There are 1 figure and 9 references, 1 of which is Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

PRESENTED: April 16, 1959 by A. F. Ioffe, Academician

SUBMITTED: April 13, 1959

PHASE I BOOK EXPLOITATION SOV/5404

Murin, A. N., V. D. Nefedov, and V. P. Shvedov, eds.

Radiokhimiya i khimiya yadernykh protsessov (Radiochemistry and the Chemistry of Nuclear Processes) Leningrad, Goskhimizdat, 1960. 784 p. Errata slip inserted. 13,000 copies printed.

Ed.: F. Yu. Rachinskiy; Tech. Ed.: Ye. Ya. Erlikh.

PURPOSE : This textbook is intended for students of physical chemistry or radiochemistry at universities and schools of higher education. It may also serve as a handbook for scientific workers and technical personnel in the radiochemical industries and other related branches.

COVERAGE: The textbook deals with problems in modern radiochemistry, including adsorption, cocrystallization, isotope exchange in radioactive elements, the chemistry of nuclear processes, and methods of preparing radioactive isotopes and labeled compounds. Special attention has been given to chemical processes caused by radioactive transformations and radiation. In the main the book was compiled by person-

Card 1/16-

MURIN, A. N., LURYE, B. G., LEBEDEV, N. A.

"The Dependence of Self-Diffusion Coefficients of ^{100}Ag On The Pressure In Silver Bromide."

report submitted for 4th Intl. Symposium on the Reactivity of Solids, Amsterdam, 30 May - 4 June 1960.

MURIN, A. N., BARASEVICH, S. N., BOGDANOV, N. I. (USSR)

"Examination of the Chemical State of Radiophosphorus in KCl Crystals Irradiated with High Energy Protons."

paper submitted for the Symposium on the Chemical Effects of Nuclear Transformation (IAEA) Prague, 24-27 Oct. 1960.

MURIN, A. N., NEFEDOV, V. P., ZAYITSEV, V. M., GRACHEV, S. A. (USSR)

"Use of Chemical Changes Accompanying Processes of Beta-Decay of RaE for the Synthesis of Organic Compounds of Polonium".

paper submitted for the Symposium on the Chemical Effects of Nuclear Transformation (IAEA) Prague, 24-27 Oct. 1960.

S/181/60/002/01/19/035
B008/B014

24.7700

AUTHORS: Banasevich, S. N., Lur'ye, B. G., Murin, A. N.

TITLE: Determination of the Effective Charge of Ca Ions in Mixed Crystals of NaCl and $CaCl_2$

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 1, pp. 80-87

TEXT: The authors determined the diffusion coefficient of Ca ions and their mobility in a constant electric field by means of radioactive Ca^{45}. The plane-parallel plates of monocrystalline NaCl were annealed after which Ca^{45} foils were sprayed on them. A special quartz tube was used for annealing both in vacuum and inert gas. The diffusion coefficient was independent of the medium. One of the diffusion profiles obtained (Ca^{45} activity distribution in the NaCl crystal) is shown in Fig. 1a. The calculated diffusion coefficients of the C^{++} ions in NaCl crystals are listed in Table 1 and represented in Fig. 2 along with data by M. Chemla. About twenty experiments were made. When calculating the effective charge $(ze)_{eff}$ the authors utilized only data for 650 and 700°C

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where the conductance of crystals is considerable. In some experiments the crystals changed their color, and dendrites were sometimes observed. The profile of diffusion was strongly deformed in experiments in which a higher tension was applied than usual. A high maximum and one to two maxima differently shifted to the cathode were found at the interface. Table 2 furnishes data of experiments in which the said phenomena could not be observed. In all experiments the following observations were made when an electric field was applied: After separation of the crystals hills and valleys were symmetrically visible on the opposed faces which reproduced exactly the shape of the applied active point. Thus, depending on experimental conditions, the interface between the central and anode crystal shifted at a distance of up to 200 μ where the active layer had been applied. A broken line on Fig. 1b represents the shift observed. After the experiments the anode crystals lost more weight than the cathode crystals. When a nitrogen current passed through the crystals, a fine powder of NaCl deposited on the graphite cathode. The weight of this powder corresponded to the weight loss of the cathode

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S/181/60/002/010/042/051
B019/B056

24 7400

AUTHORS: Murin, A. N., Lur'ye, B. G., and Lebedev, N. A.

TITLE: The Effect of Pressure Upon the Self-diffusion of Silver Ions in Silver Bromide

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 10, pp. 2606 - 2611

TEXT: In the introduction, the results of work on diffusion, electrolytical conductivity, and the mechanism of ion transfer in solid silver-bromide solutions is discussed. The authors determined the coefficients of self-diffusion of silver in pure silver bromide at 180, 220, and 280°C and pressures of 1, 1500, 3000, and 8000 atm. Tablets of AgBr (10 mm diameter, 2-3 mm thickness) were made. At one end surface of these tablets, a drop of $AgNO_3$ was applied, and tagged with Ag^{110}. After diffusion glowing, the tablets were cut into slices by means of a microtome (10 to 60 micron thick). The activity of the layers was measured by means of a scintillation counter. The experimental arrangement shown in Fig. 3 is discussed in detail. Table 2 gives the values of the self-

The Effect of Pressure Upon the Self-diffusion of Silver Ions in Silver Bromide

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diffusion coefficients of the tagged Ag^+-ions in AgBr, as measured by the authors:

Temperatur [°C]	1	1500	3000	5500	8000
280	8.3±0.6	4.8±0.2	3.6±0.2	2.25±0.05	1.25±0.03
220	1.29±0.13	0.71±0.03	0.42±0.02	0.285±0.01	0.165±0.01
180	0.25±0.01	0.16±0.01	0.10±0.005	0.067±0.008	0.058±0.007

Fig. 4 represents the function LogD = F(1/T) graphically, and it is shown that between the measured values and the values calculated by means of the diffusion formula of Einstein there is a difference. This difference decreases with increasing pressure and decreasing temperature. Finally, an estimate of the correlation factor for the internodal diffusion mechanism is made. Table 3 gives the values of the correlation factor f_0 of the internodal diffusion at 280, 220, and 180°C for pressures of 1, 1500, 3000, 5500, and 8000 kg/cm^2. With increasing temperature f_0 decreases, with increasing pressure f_0 first decreases, after

DALKHSUREN, B.; LEVENBERG, I.Yu.; MURIN, A.N.; NORSEYEV, Yu.V.; POKROVSKIY, V.P.; YUTLANDOV, I.A.

Radioactive decay series $Yb^{164} \longrightarrow Tu^{164} \longrightarrow Er^{164}$. Izv.AN SSSR.Ser.fiz. 24 no.9:1105-1108 S '60. (MIRA 13:9)
(Ytterbium--Decay)

MURIN, A.N.; doktor khim.nauk

Fourth International Symposium on Solid State Reactions. Vest.AN SSSR 30 no.12:78-80 D '60. (MIRA 13:12)
(Solids)

5(4), 21(5)

S/076/60/034/01/042/044
B004/B007

AUTHOR: Murin, A. N.

TITLE: The Problem of the Utilization Factor of the Various Methods of Isotope Separation

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol 34, Nr 1, pp 231 - 233 (USSR)

ABSTRACT: In the present paper the author compares the utilization factor of the separation of N^{14} and N^{15} according to the thermal diffusion method and according to the method developed by G. Hertz and the method of H. C. Urey. He calculates the maximum utilization factor and finds the maximum utilization factor $\approx 3.10^{-6}(c/c_o)$ for thermal diffusion (c/c_o = relative concentration of the heavier isotope); for the method by Hertz (diffusion through porous membrane), max.u.f. $\approx 2.10^{-2}(c/c_o)$, and for the method by Urey (exchange reaction) max.u.f. $\approx 1.10^{-2}(c/c_o)$. The values are given in a table. There are 1 table and 6 references, 3 of which are Soviet.

SUBMITTED: May 17, 1959

Card 1/1

81723
S/020/60/133/01/34/070
B011/B003

Synthesis of Elemental-organic Compounds of Polonium by Using Chemical Changes Taking Place During the Processes of Beta Decay of RaE

derivatives. Polonium was accumulated in crystals of $Bi(RaE)Rh_3$ and $Bi(RaE)Ph_3Cl_2$. In order to obtain these compounds with a sufficiently high specific activity, the authors made use of chemical changes occurring during the β-decay of RaD which is contained in $RaDPh_4$. The main problem was the isolation and identification of the compounds of the daughter elements of polonium (RaF), for which purpose the authors used paper chromatography. Analogous derivatives of tellurium, $TePh_2$, $TePh_2Cl_2$, and $TePh_3Cl$, labeled with Te^{127}, were used to determine the position of individual elemental-organic polonium compounds on the chromatogram. These Po compounds were separated in the presence of microquantities (μg) of these carriers. Results of measurement are shown in Fig. 1. The following values were obtained for the above-mentioned tellurium compounds in ethyl acetate: R_f: $TePh_3Cl \sim 0.1$; $TePh_2Cl_2$ 0.50 - 0.55; $TePh_2$ 0.70 - 0.75. The following values were obtained in

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Synthesis of Elemental-organic Compounds of Polonium by Using Chemical Changes Taking Place During the Processes of Beta Decay of RaE

CCl_4 (without treatment of the paper): R_f: $TePh_3Cl \sim 0$; $TePh_2Cl_2$ 0.6 - 0.7; $TePh_2 \sim 1$. Fig. 2 shows the distribution of the α-activity among various chemical modifications of polonium on accumulation in $Bi(RaE)Ph_3$ crystals: $PoPh_2Cl_2$ 15±6%; $PoPh_2$ 24±6%, and the sum of the remaining Po derivatives was 61±6%. Data are also given for CCl_4 and petroleum ether. Fig. 3 shows the results of chromatographing in ethyl acetate (R_f = 0.54). It may be seen that the chemical state has a strong effect on the yields of various RaF forms. This makes it possible to utilize chemical changes occurring in β-decay for the synthesis of the Po compounds mentioned in the title. The authors thank G. A. Razuvayev, Corresponding Member of the AS USSR, and B. K. Preobrazhenskiy for their advice. There are 3 figures and 15 references: 9 Soviet, 1 American, 4 German, and 1 Chinese.

Card 3/4

MURIN, A. N., KUTZETSOV, R. A., MOISEYEV, V. V., and KALININ, A. I.

"Determination of tracer elements in silicon dioxide through activation analysis by means of using ion-exchange chromatography"

report to be submitted for the Intl. Symposium on Pure Substances in Science and Technology, E. German Chem. Society, Dresden , E. Germany 30 Nov.-2 Dec. 1961

APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R001135620018-4"

KNUNYANTS, I.L., glav. red.; BAKHAROVSKIY, G.Ya., zam. glav. red.; BUSEV, A.I., red.; VARSHAVSKIY, Ya.M., red.; GEL'PERIN, N.I., red.; DOLIN, P.I., red.; KIREYEV, V.A., red.; MEYZERSON, G.A., red.; MURIN, A.N., red; POGODIN, S.A., red.; REBINDER, P.A., red.; SLONIMSKIY, G.S., red.; STEPANENKO, B.N., red.; EPSHTEYN, D.A., red.; VASKEVICH, D.N., nauchnyy red.; GALLE, R.R., nauchnyy red.; GARKOVENKO, R.V., nauchnyy red.; GODIN, Z.I., nauchnyy red.; MOSTOVENKO, N.P., nauchnyy red.; LEBEDEVA, V.A., mladshiy red.; TRUKHANOVA, M.Ye., mladshiy red.; FILIPPOVA, K.V., mladshiy red.; ZHAROVA, Ye.I., red.; KULIDZHANOVA, I.D., tekhn. red.

[Concise chemical encyclopedia] Kratkaia khimicheskaia entsiklopediia. Red. koll.: I.L.Knuniants i dr. Moskva, Gos. nauchn. izd-vo "Sovetskaia entsiklopediia." Vol.1. A - E. 1961. 1262 columns. (MIRA 15:2)

(Chemistry--Dictionaries)

MURIN, A.N.; BANASEVICH, S.N.; BOGDANOV, R.V.

Chemical state of radiophosphorus in KCl crystals irradiated by high energy protons. Izv. AN SSSR. Otd.khim.nauk no.8:1433-1437 Ag '61. (MIRA 14:8)

1. Radiyevyy institut im. V.G. Khlopina i Leningradskiy gosudarstvennyy universitet.
(Phosphorus—Isotopes)
(Potassium chloride crystals)
(Protons)

23883
S/186/61/003/001/016/020
A051/A129

21.3200

AUTHORS: Murin, A.N., Nefedov, V.D., Larionov, O.V.

TITLE: The separation of nuclear isomers of tellurium

PERIODICAL: Radiokhimiya, v 3, no 1, 1961, 90-96

TEXT: The authors have developed a new method for the separation of nuclear isomers of tellurium and the separation of lower isomer compound states without a carrier, as well as a method for the separation of radio-chemically pure Te^{127} from irradiated tellurium dimethyldinitrate with neutrons (and γ -quanta). They show that the extraction of Te^{127} from the irradiated sample reaches a yield close to 100%, which corresponds to the break of the chemical bond in each converted isomer transition. The greater part (about 91%) of the extracted Te^{127} is in the lower tetra-valent state and only about 9% is in the hexa-valent state. The initial compound used for the separation of the main isomer state of tellurium was tellurium dimethyldi-

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The separation of nuclear isomers of tellurium

when accumulated in crystals. The high yields noted by the authors are thought to be the result of the sharply expressed irreversibility of the occurring chemical changes during isomer transition when using $(CH_3)_2Te(NO_3)_2$. The data of Table 2 show that with an accumulation of Te in the crystals the yield of the basic state is somewhat less since in this case there is a greater stabilitiy of the basic state of Te^{127} in the form of the initial tellurium dimethyldinitrate compound. The difference in the chemical behavior of the tetra and hexa-valent states of Te helps to solve the problem of Te distribution between these valency states. The study of this question was carried out by the isotopes carrier method corresponding to various chemical compounds (TeO_2 and H_2TeO_4). The separation of the 6- and 4-valent Te was based on the reduction of the latter to the elemental state by sulfurdioxide in a 3 n solution of HCl (Ref 12). The average yields are equal to $8.5\pm1.2\%$ and $91.5\pm1.2\%$, respectively. The fact that most of Te^{127} is in the lower valency state is explained by secondary processes which occur after the above-mentioned phenomena. The activation of Te in the main state was conducted on a betatron and the separation of Te in the main state was carried out according to the reaction (γ,n) (Fig 4). There are 4 figures, 4 tables and 14 references: 6 Soviet-bloc, 8 non-Soviet-bloc.

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S/181/61/003/002/003/050
B102/B204

9,4310 (and 1035, 1143)

AUTHORS: Murin, A. N. and Samosyuk, G. P.

TITLE: Diffusion of impurities in an infinite plate

PERIODICAL: Fizika tverdogo tela, v. 3, no. 2, 1961, 342-349

TEXT: The present paper deals with a theoretical investigation of the diffusion of impurities in an infinite semiconductor plate located in a reservoir, which is evacuated at a finite rate. Similar tasks have already been dealt with, however, only for the case of a semi-infinite semiconductor or a very thick plate respectively. The model underlying the calculations in this case assumes that the impurity atom in the solid is in a periodic potential field, as shown in Fig.1. E_D corresponds to the activation energy of the diffusion process, E_1 is the energy, which the impurity atom would have to possess in order to be able to leave the solid and to penetrate into the gaseous phase ($E_1 \simeq E_D$); E_2 is the activation energy for the penetration of an atom adsorbed on the surface of the solid into this solid; E_3 is the corresponding energy for an atom still

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in the gaseous phase. The number of impurity atoms leaving the semiconductor per unit area of its surface per unit time is $aC(-1,t)\nu_1\alpha_1\exp(-E_1/kT)$, where a is the interatomic distance in the direction perpendicular to the surface, $C(-1,t)$ is the concentration of the impurity atoms on the surface at the time t, ν_1 is a parameter corresponding to the entropy factor, which is a function of the atomic vibration frequency, α_1 is a geometry factor. The number of atoms penetrating the solid from the gas is given by $C_g(t)\bar{v}\beta_0\exp(-E_3/kT)$. $C_g(t)$ is the concentration of the impurity atoms in the gaseous phase, $\bar{v}$ - the mean velocity of the atoms in the gas, β_0 - a constant, which considers the direction of the atom hitting the surface of the body. The number of the penetrating atoms to be adsorbed is $Q_A(t)\nu_2\alpha_2\cdot\exp(-E_2/kT)$, where Q_A is the number of adsorbed atoms per unit area. If the impurity concentration in the gaseous phase is small, then $Q_A = a\bar{C}_g(t)$, where $\bar{C}$ is a constant. The problem consists only in an integration of the equation

$D\frac{\partial^2 D(x,t)}{\partial x^2} = \frac{\partial C(x,t)}{\partial t}$ (11), where D is the diffusion coefficient of the impurity atoms, with the following boundary conditions:

$\mathcal{L}_{-1}C \equiv D\frac{\partial C(-1,\ t)}{\partial x} - KC(-1,\ t) + A'D\exp(-L't)\int_0^t \frac{\partial C(-1,\ t)}{\partial x}\exp(L't)dt = 0$

(8). For $x = 1$, $\mathcal{L}_1 C \equiv D\frac{\partial C(1,\ t)}{\partial x} + kC(1,\ t) + A'D\exp(-L't)\int_0^t \frac{\partial C(1,t)}{\partial x}\exp(L't)dt$ $= 0$ (9) holds with $L' = \frac{L}{V'}$, $A' = \frac{KK_g A}{V'}$. The initial condition is: $C(x,0) = C_0$ (10). For the purpose of solving this equation, one introduces: $u(x,o) = \int_0^\infty C(x,t)\exp(-pt)dt$, and after some intermediate steps C(x,t) is obtained in the following form:

$$C(x,\ t) = -\frac{C_0}{2\pi i}\int_{\beta-i\infty}^{\beta+i\infty}\frac{N(p)}{p\varphi(p)}\operatorname{ch}\sqrt{\frac{p}{D}}x\exp(pt)\,dp + C_0,\quad (\beta > 0),\quad (16)$$

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Diffusion of impurities... $\operatorname{ctg}\lambda_m l = \frac{M_m\lambda_m}{N_m}$,

which with $M_m = D(-\lambda_m^2 D + L' + A')$; $N_m = K(-\lambda_m^2 D + L')$, (18)

$$\sin\lambda_m l = \frac{\delta_m N_m}{\sqrt{M_m^2\lambda_m^2 + N_m^2}}; \quad \cos\lambda_m l = \frac{\delta_m M_m\lambda_m}{\sqrt{M_m^2\lambda_m^2 + N_m^2}}, \tag{19}$$

$\delta_m = \operatorname{sng}(N_m \sin\lambda_m l)$.

and $$C(x, t) = 2C_0 \sum_{m=1}^{\infty} \lambda_m^{-1}\delta_m F_m N_m \sqrt{M_m^2\lambda_m^2 + N_m^2}\cos\lambda_m x \exp(-D\lambda_m^2 t), \tag{20}$$

где $F_m = [l(M_m^2\lambda_m^2 + N_m^2) + M_m N_m + 2KD^2A'\lambda_m^4]^{-1}$.

Обозначим

$$\bar{C}(x, t) = 2C_0 KL' \sum_{m=1}^{\infty} \delta_m\lambda_m^{-1}F_m \sqrt{M_m^2\lambda_m^2 + N_m^2}\cos\lambda_m x \exp(-D\lambda_m^2 t), \tag{21}$$

gives the following solution: $C(x,t) = \bar{C}(x,t) + L'^{-1}\frac{\partial\bar{C}(x,t)}{\partial t}$ (22). The function (20) is the solution of the problem (8) - (11) and $\bar{C}(x,t)$ is the solution of (11), which satisfies the initial condition (10) and the boundary conditions $\mathcal{L}_{-1}\bar{C} = -C_0 K\exp(-L't)$, $\mathcal{L}_1\bar{C} = C_0 K\exp(-L't)$. As solution

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of (8) - (11) with L' = 0 one obtains

$$C_1(x, t) = \frac{C_0 A' l}{K + A' l} + 2C_0 K \sum_{m=1}^{\infty} \delta'_m F'_m \sqrt{M'^2_m + K^2\lambda^2_m} \cos\lambda_m x \exp(-D\lambda^2_m t), \quad (29)$$

where

$$M'_m = -D\lambda^2_m + A'; \quad F'_m = [lM'^2_m + (lK + D)K\lambda^2_m + A'K]^{-1};$$

$$\delta'_m = \operatorname{sng}(\sin\lambda_m l). \quad (30)$$

and with $\sin\lambda_m l = \delta'_m K\lambda_m / \sqrt{M'^2_m + K^2\lambda^2_m}$ and $\cos\lambda_m l = -\delta'_m M'_m / \sqrt{M'^2_m + K^2\lambda^2_m}$

$$\left.\begin{aligned} 2KA' \sum_{m=1}^{\infty} F'_m &= A' l (K + A' l)^{-1}, \\ 2KD \sum_{m=1}^{\infty} \lambda^2_m F'_m &= 1. \end{aligned}\right\} \quad (32)$$

$$\frac{C_1(l, t)}{C_0} = \frac{A' l}{K + A' l} + 2KD \sum_{m=1}^{\infty} \lambda^2_m F'_m \exp(-D\lambda^2_m t) -$$

$$-2KA' \sum_{m=1}^{\infty} F'_m \exp(-D\lambda^2_m t), \quad (33)$$

Diffusion of impurities...

$$\frac{K_g C_g(t)}{C_0} = \frac{A'l}{K + A'l} - 2KA' \sum_{m=1}^{\infty} F'_m \exp(-D\lambda_m^2 t), \qquad (34)$$

$$C_g(t) = \frac{1}{2}\frac{A}{V'}\int_{-l}^{l}[C_0 - C_1(x, t)]\,dx = -\frac{DA}{V'}\int_0^t \frac{\partial C_1(l, t)}{\partial x}\,dt.$$

$$\left.\begin{aligned} &\frac{A'l}{K + A'l}[1 - \exp(-D\lambda_1^2 t)] + 2KD\lambda_1^2 F'_1 \exp(-D\lambda_1^2 t) \leqslant \frac{C(l, t)}{C_0} \leqslant \\ &\leqslant \frac{A'l}{K + A'l} + (1 - 2KA'F'_1)\exp(-D\lambda_1^2 t), \\ &\frac{A'l}{K + A'l}[1 - \exp(-D\lambda_1^2 t)] \leqslant \frac{K_g C_g(t)}{C_0} \leqslant \frac{A'l}{K + A'l} - \\ &\qquad - 2KA'F'_1 \exp(-D\lambda_1^2 t). \end{aligned}\right\} \qquad (35)$$

hold. By means of these formulas numerical computations for the following cases were carried out: Case a_0: $0.4K_gD/K = V'/A$, $K/D = 20\ cm^{-1}$; case a_1: $2K_gD/K = V'/A$, $K/D = 20\ cm^{-1}$; case a_2: $4K_gD/K = V'/A$, $K/D = 20\ cm^{-1}$;

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B102/B204

Diffusion of impurities...

case a_3: $8K_gD/K = V'/A$, $K/D = 20\ cm^{-1}$; case a_4: $4K_gD/K = V'/A$, $K/D = 200 cm^{-1}$. For these cases, Fig. 5 shows the impurity concentration on the surface, and Fig.6 the impurity concentration in the gaseous phase. The broken lines give the corresponding horizontal asymptotes: For a_0, $\mu_0 \simeq 1.58$, for a_1, a_2, a_3 is $\mu_0 < \pi/2$ and for a_4 it is $\mu_0 = 5$. There are 6 figures and 3 references: 1 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. Zhdanova
(Leningrad State University imeni Zhdanov)

SUBMITTED: March 29, 1960

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20 11

9,4300 (and 1043, 1155)

S/161/61/003/002/012/050
B102/B204

AUTHORS: Murin, A. N., Lur'ye, B. G., Banasevich, S. N., Samosyuk, G. P., Ignatovich, Ya. L.

TITLE: Diffusion and electrolytic migration of P^{32} in KCl-crystals irradiated by 660-Mev protons

PERIODICAL: Fizika tverdogo tela, v. 3, no. 2, 1961, 398-407

TEXT: One of the many possibilities of introducing impurity atoms into a crystal lattice consists in irradiating the latter with neutrons or protons in such a manner that nuclear transformations may occur. Thus, the introduction of P^{32} into alkali chlorides with neutron irradiation is possible as a result of the reaction $Cl^{35}(n,\alpha)P^{32}$ (Ref. 1), in the case of proton irradiation of KCl as a result of the reactions $Cl_{17}(p; 3p,xn)P^{32}_{15}$ and $K_{19}(p; 5p,xn)P^{32}_{15}$. The authors investigated diffusion and migration of the P^{32} formed by proton irradiation of KCl, and gave a detailed report on the results obtained. The KCl-single

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crystals used were first heated in an N_2-atmosphere at 700°C for several hours, after which they were slowly cooled to room temperature. Irradiation with 660-Mev protons was carried out on the synchro-cyclotron of the Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research); the crystals had a size of 1.5 × 1.5 × 0.2 cm and were irradiated perpendicular to the quadratic surface. In view of the fact that with such an irradiation, also Be^7(53.6 d), Na^{24}(15.0 h), P^{32}(14.5 d), S^{35}(87 d), and Ar^{37}(32 d) may be formed apart from short-lived isotopes, special investigations were carried out for the purpose of determining their relative intensities. These investigations are described in the introduction; they led to the result that one week after the end of irradiation, 99% of the activity measured by means of an end-window counter must be ascribed to P^{32}. The specimens irradiated were heated in quartz tubes, through which pure N_2 streamed, by means of an electric furnace, and the diffusion was investigated. The conditions of heat treatment varied between 2 hours at 736°C up to 190 hours at 650°C. For the purpose of

investigating the edge effect with respect to activity distribution, 10 μ thick layers were taken off by means of a microtome parallel to the quadratic surface, and their activities were measured. The diffusion coefficient of P^{32} was calculated according to the approximation formula $(C_o-C)/C \cdot \exp(-x^2/4Dt)$, where C_o is the initial concentration, C - the concentration at the time t at a distance x from the crystal surface. The distribution of P^{32} in the KCl-crystal after heating for 190 hours to 650°C is shown by Fig. 1 (curve a: $D = 1.76 \cdot 10^{-9} cm^2 sec^{-1}$, curve b: $D = 1.87 \cdot 10^{-9} cm^2 sec^{-1}$). An investigation of the temperature dependence of the diffusion coefficient within the high temperature range showed that log D depends linearly on 1/T. From the inclination of the straight line, the activation energy of diffusion was calculated as amounting to 3.2 ev. The effect produced upon the diffusion of P^{32} in KCl by a constant electric field was investigated on a system of 3 crystals (at 736°C). Fig. 3 shows the activity distribution after heating for 8 hours; at first, only the crystal denoted by I was

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active. Migration may be distinctly seen from Figs. 4 and 5. At 4 different field strengths, 4 series of experiments were carried out. The numerical results of these experiments are given in the table. The charge q of the phosphor ions was calculated according to the Einstein relation $\mu/D = q/kT$. The results obtained by the investigations are finally theoretically dealt with and discussed in detail. The results obtained indicate that phosphorus in potassium chloride together with chlorine ions form negative complex ions $(PCl_6)^{-1}$. The phosphor then enters the complex in the form $(P^{+5}4K_n^+6Cl^{-1})^{-1}$, where K_L^+ is a K^+ vacancy. The authors finally thank Professor V. I. Dzhelepov, Director of the Laboratoriya yadernykh problem OIYaI (Laboratory for Nuclear Problems of the OIYaI), for his interest. There are 7 figures, 1 table, and 11 references: 4 Soviet-bloc and 7 non-Soviet-bloc.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

Card 4/6

MURIN, A.N.; BANASEVICH, S.N.; GRUSHKO, Yu.S.

Diffusion of calcium ions in mixed NaCl+$CaCl_2$ crystals. Fiz. tver. tela 3 no.8:2427-2433 Ag '61. (MIRA 14:8)

1. Leningradskiy gosudarstvennyy universitet im. A.A. Zhdanova.
(Diffusion) (Calcium) (Chlorides)

S/ [illegible]/003/011/007/056
[illegible]/[illegible]

AUTHORS: Murin, A. N., Lur'ye, B. G., and Tarlakov, Yu. P.

TITLE: Electrical conductivity and self-diffusion of silver in silver iodide at high pressures

PERIODICAL: Fizika tverdogo tela, v. 3, no. 11, 1961, 3299-3305

TEXT: AgI is distinguished by an abnormally high conductivity and by the existence of several modifications. It has already been investigated many times, among others, by the authors together with N. A. Lebedev (FTT, 2, 2607, 1960). The present paper reports on investigations of the pressure and temperature dependences of electrical conductivity and Ag self-diffusion coefficients at pressures up to 6000 kg/cm^2. The AgI was produced from chemically pure elements, ground and pressed at 5000 kg/cm^2 to tablets. They had a density of 5.5 - 5.6 g/cm^3 (monocrystalline density: 5.67 g/cm^3). Electrical conductivity was measured in a pressure

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cell. For diffusion investigation Ag^{110m} was deposited from an $Ag^{*}NO_3$ solution on to a silver plate which was then exposed to iodine vapor so that an Ag-tagged $Ag^{*}I$ surface film was formed. This silver plate was then brought together with an AgI tablet, and diffusion took place at a certain temperature and a certain pressure. Then the silver plate was dissolved in HNO_3 and 15 to 30 μ thick layers were cut from the tablets. Their activity was measured with a gamma scintillation counter. The data were used to plot diagrams: logarithm of specific activity as functions of the square distance. The self-diffusion coefficient was determined from the gradient of the straight lines. The Bridgman phase diagram (Proc. Amer. Acad., 51, 57, 1915) is discussed in detail. The results of the measurements are presented in Fig. 4. In all cases (all phases, temperatures and pressures) the measured values of the self-diffusion coefficients are much higher than the calculated ones. This might be explained by assuming a circular diffusion for the α modification and in states similar to it. For the other modifications instability of the lattice could be responsible for the high experimental values. There are 4 figures, 1 table, and 21 references: 4 Soviet and 17 non-Soviet. The

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three most recent references to English-language publications read as follows: A. I. Mayimdar a. R. Roy. J. Phys. Chem. 63, 1853, 1959; K. Zimen et al. J. Chem. Soc., Supl. 2, 392, 1949; S. W. Kurcniok. J. Chem. Phys., 20, 218, 1952.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: May 9, 1961

Fig. 4. Ag self-diffusion coefficient as a function of pressure at 90 and 110°C.
Legend: (a) measured, (b) calculated. (1) D_m at 110°C; (2) D_c at 110°C; (3) D_m at 90°C; (4) D_c at 90°C.

Electrical conductivity and self-...

S/181/61/003/011/007/056
B102, B138

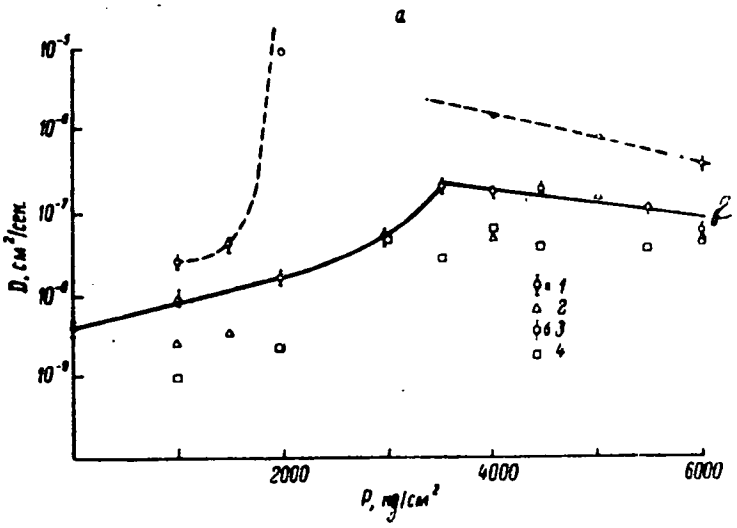

FIG. 4

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BELYAYEV, B.N.; KALYAMIN, A.V.; MURIN, A.N.

Probability ratio of α-decay and E-capture for the isotopes $Po^{200, 201, 203}$. Izv. AN SSSR. Ser. fiz. 25 no.7:874-878 Jl '61. (MIRA 14:7)

1. Radiyevyy institut im. V.G. Khlopina AN SSSR.
(Alpha rays) (Electrons--Capture) (Polonium--Isotopes)

BELYAYEV, B.N.; KALYAMIN, A.V.; MURIN, A.N.

Reduced derived width δ^2_L for Po isotopes. Izv. AN SSSR. Ser. fiz. 25 no.7:879-881 Jl '61. (MIRA 14:7)

1. Radiyevyy institut AN SSSR im. V.G. Khlopina.
(Polonium--Decay) (Alpha rays)

26441
S/048/61/025/007/003/005
B108/B209

24,660

AUTHORS: Baranovskiy, V. N., and Murin, A. N.

TITLE: Calculation of the production cross section for spallation fragments

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 25, no. 7, 1961, 882 - 892

TEXT: This paper was read at the XI Annual Conference on Nuclear Spectroscopy in Riga, January 25 - February 2, 1961. S. G. Rudstam's method of calculating the above cross section (Refs. 3, 4: Phil. Mag., 46, 344 (1955); Spallation of Medium Weight Elements. Univ. of Uppsala, Sweden, 1956) is not applicable to heavy-nucleus spallation; it has to be modified. The following are the three formulas on which the calculations are based: $\sigma(A,Z)_{ind} = \left[\exp\left[pA - q - R(Z-SA)^2\right]\right.$ (1) for the cross section of the individual fragments from spallation, $\sigma(A,Z)_{sum} = e^{-pA-Q}\int_{Z-1/2}^{\infty} e^{-R(Z'-SA)^2} dZ'$ for the total production cross section, and

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Calculation of the...

$\sigma(A) = e^{pA-q} \int_{-\infty}^{\infty} e^{-R(Z-SA)^2} dZ$ for the total cross section of isobars (with given A) produced in spallation. The parameter R determines the curvature of the curve $\frac{\sigma(A,Z)_{sum}}{\sigma(A)} = f(Z-SA)$ and, when S is properly chosen, all points must lie on a curve of the form $0.5 - \Phi(a)$. $\Phi(a) = \frac{1}{\sqrt{\pi}} \int_0^a e^{-t^2} dt$ is a tabulated function, with the aid of which the individual and total cross sections may be written in the form $\sigma(A,Z)_{ind} = \sigma(A)\left[\Phi(\sqrt{R}\ (Z - SA + 1/2)) - \Phi(\sqrt{R}\ (Z - SA - 1/2))\right]$ (5) and $\sigma(A,Z)_{sum} = \sigma(A)\left[0.5 - \Phi(\sqrt{R}\ (Z - SA - 1/2))\right]$ (4). Strictly speaking, the parameter R in (1) is not the same as that in (4) and (5) but is connected with that in (1) by the relation $R = 4\pi\left[\Phi(\frac{1}{2}\sqrt{R'})\right]^2$. In short, the following recipe may be traced: Construction of a $\sigma(A)$ curve, choice of the parameter S, construction of the $f(Z - SA)$ curve as indicated above. $Z - SA = 0$ should

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MURIN, A.N.

Theory of the thermal-diffusion column for the separation of liquids. Zhur. fiz. khim. 35 no.3:517-520 Mr '61. (MIRA 14:3)
(Diffusion) (Solution(Chemistry))

BELYAYEV, B.N.; KALYAMIN, A.V.; MURIN, A.N.

Experimental and calculated cross sections of the reaction $Bi^{209}(p, xn)$ Po under bombardment by 135 Mev. protons. Dokl. AN SSSR 140 no.2:337-339 S '61. (MIRA 14:9)

1. Radiyevyy institut im. V.G.Khlopina AN SSSR. Predstavleno akademikom A.P.Vinogradovym.

(Nuclear reactions)

S/020/61/141/001/011/021
B103/B147

AUTHORS: Kalinin, A. I., Kuznetsov, R. A., Moiseyev, V. V., and Marin, A. N.

TITLE: Use of ion exchange chromatography for the activation analysis of microimpurities in silica

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 1, 1961, 95 - 100

TEXT: The authors state that the two usual methods of determining microimpurities in highly pure substances (in this case SiO_2) have several shortcomings. Therefore, they used ion exchange chromatography for separating activated impurities in SiO_2. Advantages of this method over the usual analytical methods: the elements to be determined can be quickly and reliably isolated in radiochemically pure state from a complex mixture. A quantitative separation is achieved by choosing the proper absorption and elution conditions in ionites. The use of microcolumns (diameter 2 mm) accelerates the separation of microquantities and saves reagents. The amounts of the elements to be separated were determined from the

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consumption of carriers added. The sample to be activated was fused in a quartz ampul. The standard solution was dried in a polyethylene ampul in a vacuum exsiccator, and the ampul was sealed. Both sample and standards together were irradiated in an atomic reactor. The surface impurities were rinsed from the sample with aqua regia under heating. A carrier solution containing 10 μg of each element to be determined was added to the sample, which was then decomposed with HF + HNO_3 mixture, evaporated together with HF, and diluted with water. The solution was conducted through a polyethylene column filled with strongly basic anionite AB-17 (AV-17) in F^- form (content of divinyl benzene 8 - 10%, grain size 30-40 μ, layer thickness > cm). Elements forming negative fluoride complexes are absorbed: Sn^{IV}, Mo^{VI}, W^{VI}, As^{V}, Ta^{V}, Sb^{V} and Au^{III}. Sn, Mo, W and As can be successively eluted with a 17 N HF solution. This, however, requires long columns and much time. Therefore, the elements are eluted together and separated on a 30 mm long column containing AV-17 anionite in Cl^- form. Differently strong HCl + HF solutions serve as eluents. The slow elution of the tantalum fluoride complex is accelerated by addition of the NO_3^- ion. Antimony can be eluted only with 7 N $HClO_4$.

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Use of ion exchange chromatography ...

gold only with thiourea. The mixture of elements which were not absorbed in the HF medium is evaporated several times together with HCl and introduced in 70 mm long columns with AV-17 anionite in Cl^- form. Strongly forming negative chloride complexes are absorbed: Cu^{II}, Co^{II}, In^{III}, Ga^{III}, Zn^{II}, Cd^{II}, and Hg^{II}. Differently strong HCl is primarily used as eluant. To improve the separation of Co from Cu, these elements are eluted immediately after removing the non-absorbed elements with 4 N HCl. Next indium is eluted with 11.6 N HCl. Fe is eluted together with gallium. Iron irradiated for a short time does not disturb the Ga determination. If necessary, Ga and Fe are separated on a cationite. The entire separation cycle for determining microimpurities in SiO_2 took about 4 hr (without the time necessary for decomposing the sample)[2]. The radiochemical purity of the elements isolated was checked by γ-spectrophotometry and determination of the half-life period. The study was suggested by Yu. V. Morachevskiy. There are 3 figures, 1 table, and [illegible] references: 3 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: J. P. Faris, Anal. Chem. 32, No. 4, 520 (1960); K. A. Kraus, F. Nelson, Am. Soc. Testing Materials, Spec. Techn.

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Use of ion exchange chromatography

S/020/61/141/001/011/021
B104/B147

Publ., No. 195, 27 (1918)

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR, Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova (Leningrad State University imeni A. A. Zhdanov)

PRESENTED: June 5, 1961 by I. V. Tananayev, Academician

SUBMITTED: June 2, 1961

Card 4/4

S/624/62/000/000/004/004
B164/B102

AUTHORS: Belyayev, B. N., Murin, A. N.

TITLE: Results of an investigation into the interaction of fast protons with heavy nuclei considering fission

SOURCE: Fizika deleniya atomnykh yader. Ed. by N. A. Perfilov and V. P. Eysmont, Moscow, Gosatomizdat, 1962, 203 - 209

TEXT: The momentum distribution and the excitation energy of the reaction products for interaction of 155-Mev protons with Bi^{209} nuclei is studied. This is done by the Monte-Carlo method assuming a "cascade-evaporation model". Further, the effect of the evaporation on the momentum spectrum of the recoil nuclei is examined. Also the mean values of the recoil momenta and of the excitation energy for the nucleus undergoing fission as well as the fission cross section are determined. To calculate the excitation energy of the nucleus, the spectra of the components of the recoil momenta parallel ($p_{\parallel}$) and perpendicular ($p_{\perp}$) to the direction of the incident protons are analyzed for the pure cascade process and for the cascade-plus-evaporation process. Comparison shows that when evaporation is taken into account the momentum spectra appear broader and $p_{\perp}$ to be increased by 24%.
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The mean values of the momentum components and of the excitation energy $\overline{E}$ are derived from this representation. Determining $\overline{E}$ from $p_{\parallel}$ leads to an unambiguous relationship between these two quantities which is independent of whether the evaporation is taken into account or not. In studying the fission process in photoemulsions, this relationship can be used to determine the mean excitation energy of the nucleus undergoing fission. The fission cross section of the interaction considered between protons and Bi^{209} nuclei is 95±13 mbarn. The mean excitation energy after the cascade for the nucleus under fission is 112 Mev. As about 10 Mev fall on each nucleon during evaporation it follows that an average of 10 - 11 neutrons are evaporated in the fission; this is consistent with other experimental data. Thus, the sum of the mass numbers of the most probable fission products is 198 - 199. As the spectra of the excitation energies and of the momenta after the cascade process in the case in question differ only slightly from those of U and Th it is possible also to give some data for the nucleus undergoing fission can be given for the bombardment of U and Th by protons, provided that the respective probabilities of fission at the different excitation energies are known. Experimental data from various

S/024/62/000/000/004/004
Results of an investigation into... B164/B102

authors are compared with the results calculated for a proton energy of 155 Mev. Agreement is good, which points to a possibility of using the cascade model in studying the momentum spectrum of the recoil nuclei at lower bombarding energies, up to 100 Mev. There are 4 figures and 2 tables.

Card 3/3

MURIN, A.N.

Yields of products of splitting and fission under the effect of high-energy particles. Radiokhimia 4 no.1:125-128 '62. (MIRA 15:4)

(Fission products) (Particles (Nuclear physics))

BARANOVSKIY, V.I.; MURIN, A.N.; PREOBRAZHENSKIY, B.K.

Radiochemical study of the reactions of deep spallation and fission of tantalum by 680-MEV protons. Radiokhimia 4 no.4:470-479 '62. (MIRA 15:11)

(Tantalum--Isotopes)
(Nuclear fission) (Radiochemistry)

S/181/62/004/007/027/037
B178/B104

AUTHORS: Lur'ye, B. G., Murin, A. N., and Brugevich, R. F.

TITLE: Diffusion and electrolytic migration of manganese ions in a mixture of NaCl and $MnCl_2$ crystals

PERIODICAL: Fizika tverdogo tela, v. 4, no. 7, 1962, 1957-1958

TEXT: The diffusion of Mn ions in a mixture of NaCl and $MnCl_2$ crystals and in pure NaCl was investigated. The mixed crystals, which contained about 0.02 mole% Mn, were grown by the method of Kiropulos. Radioactive Mn^{54} dissolved in alcohol was applied to a crystal plate. After subjecting specimen to diffusion annealing the gamma activity of microtom sections was determined with a 4π scintillation counter (E = 0.89 Mev). The activation energy of an M^{++} ion on transition into the associated vacancy is 0.71 ev, the frequency of natural oscillations of Mn^{++} is $6.3 \cdot 10^{11}$ sec^{-1}, the association enthalpy of the complex is 0.7 ev, and the association entropy, $-\Delta S_a$, is $1.9 \cdot 10^{-4}$ /deg. The free energy of association

Card 1/2

is given by $\Delta G_a = (0.7\text{-}1.9)\cdot 10^{-4}T$. Allowing for the mobility of Mn^{++} ions in the electric field, the effective ion charge at 500, 600, and 700°C is estimated at $(5\text{-}9)\cdot 10^{-2}e$, where $e = 4.8\cdot 10^{-4}$ CGSE. The lifetime of the complex $Mn^{++}Na^{+}_{\square}$ is $9\cdot 10^{-6}$ sec, and the period between the reorientations of the complex is $8\cdot 10^{-7}$ sec. There are 1 figure and 1 table.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet (Leningrad State University)

SUBMITTED: March 6, 1962

MURIN, A.N.; BANASEVICH, S.N.[deceased]; MOROZOVA, I.M.

Diffusion of radiogenic gases from minerals. Geokhimiia no.10:874-879 '62. (MIRA 16:4)

1. State University, Leningrad Laboratory of Precambrian Geology, Academy of Sciences, U.S.S.R.
(Gases—Diffusion)

S/089/62/013/004/001/011
B102/B108

AUTHORS: Belyayev, B. N., Murin, A. N.

TITLE: Calculation of the interaction between fast protons and heavy nuclei with allowance for the fission process

PERIODICAL: Atomnaya energiya, v. 13, no. 4, 1962, 317 - 320

TEXT: The interaction of 135-Mev protons with Bi^{209} nuclei was calculated by the Monte Carlo method in order to gain a better insight into the mechanism of fission induced by fast protons and into the distribution of momentum and excitation energies of the products from interaction between fast protons and nuclei. The cascade and the evaporation stage were calculated on the assumption that $r_0 = 1.45 \cdot 10^{-13}$ cm, and on the basis of Fermi's statistics. The level density was assumed in the form $\rho(E^*) = C \exp 2\sqrt{a(E^*-\delta)}$, where E^* is the nuclear excitation energy, C is a constant independent of E^*, a is a level density parameter ($a = A/10$), and δ is a factor to account for both the parity and the shell effect, calculated according to Cameron (Canad. J. Phys., 36, no. 8, 1040, 1958). The

Card 1/3

[illegible] energies are calculated using [illegible]'s tables and from experimental data (Physica, [illegible]1, no. [illegible], [illegible]7; [illegible], 19[illegible]). The nuclear excitation energy [illegible] the [illegible] determined from the momentum distribution of the recoil nuclei; the contributions of the cascade and evaporation processes being each estimated separately. The ratios of the mean transverse and longitudinal recoil momenta to the momentum of the compound nucleus, $\bar{P}_{\perp}/P_{c.n.}$ and $\bar{P}_{\parallel}/P_{c.n.}$, as well as E^* were found to be, respectively, 0.52[illegible], [illegible]2, and [illegible]7 Mev for the case [illegible], [illegible], respectively, 0.[illegible]2, 0.[illegible], and [illegible]7 Mev for the cascade-plus-evaporation stage. Taking allowance for the processes of evaporation increases $\bar{P}_{\perp}$ by [illegible]. $\bar{P}_{\parallel}/P_{c.n.}$ increases almost linearly with $E^*/E_{c.n.}$, [illegible] whether this is calculated with or without allowance for evaporation and whether $r_0 = 1.3\cdot 10^{-13}$ or $1.[illegible]\cdot 10^{-13}$ cm. Allowance for the processes of evaporation leads to a [illegible] of the distribution for both momentum ratios, and in the case of $\bar{P}_{\perp}/P_{c.n.}$ the maximum is shifted towards greater values of this ratio. The value of σ_r = [illegible]±13 mb obtained for E_p = 135 Mev and a

Card 2/3

Calculation of the interaction ...

Bi^{209} target is fairly consistent with experimental results. After decay Sr was found to be 112 Mev, and the most probable excitation energy ranged from 110 to 120 Mev. If, therefore, an energy of about 10 Mev is assumed to be imparted to one nucleon during evaporation, the average total number of neutrons emitted during fission will be 10 or 11. This is in good agreement with the experimental value of 10 ± 2.7 n. The sum of mass numbers of the most probable fragments amounts to 199 - 198 and is thus very close to the experimental value of 196. The momentum and excitation energy distributions obtained for Bi^{209} differ only little from the values found for U and Th. There are 4 figures and 2 tables.

SUBMITTED: November 27, 1961

Card 3/3

S/048/62/026/002/014/032
B106/B108

AUTHORS: Kalyamin, A. V., Murin, A. N., and Preobrazhenskiy, B. K.

TITLE: Products of deep fission processes Bi^{209} (p; xn, yp)

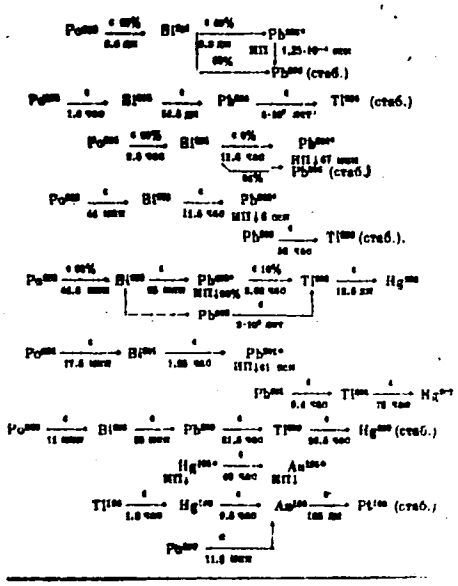
PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 2, 1962, 245-247

TEXT: The product yields were determined for the following radioactive decay processes:

Card 1/6

S/048/62/026/002/014/032
B106/B108

Products of deep fission ...



Card 2/6

S/048/62/026/002/014/032
B106/B108

Products of deep fission . . .

ДН denotes days, сек seconds, стаб stable, час hours, мин minutes and лет years. All these reactions were initiated by bombarding Bi^{209} with 135-Mev protons yielding the mentioned polonium radioisotopes $Po^{200-208}$. The compositions of the resulting fractions (Bi, Pb Tl, Au) were studied with a scintillation γ-spectrometer (NaI(Tl) crystal) with multichannel analyzer. The activities were measured in 4π geometry (CsI(Tl) crystal). The number of atoms of the individual radioisotopes was determined by decomposing the complex decay curve into the individual components. In addition to the yields in polonium isotopes, the individual and total yields of $Bi^{203, 204, 205, 206}$, Tl^{201} and Pb^{200} isotopes were determined In all cases, the individual yield in Tl^{200} proved to be so small that it did not exert any considerable effect on the total yield in nuclei with mass number 200. The total yield in nuclei with mass number 195 as determined from the Au^{195} yield agreed as expected with the Po^{199} yield (as determined from its α-decay) within the limits of experimental error. The yield curve for the fission products was plotted from results (Fig) In the chain of radioactive nuclei with the mass number 202, the problem of a possible

Card 3/6

Products of deep fission ...

ε-capture on one of the Pb^{202} levels which lie below the isomeric level (Pb^{202*}) remained unsolved for the Bi^{202} isotope. If with Bi^{202} such an ε-capture on low Pb^{202} levels does not take place, the total yield in nuclei of the $Po^{202} \rightarrow Tl^{202}$ chain will be ten times the total yield in Tl^{202} (Fig.). The yield in Po^{202} is not less than the tenfold yield in Tl^{202}, i.e., not less than the total yield in nuclei of the chain. On the assumption that the chain yield is too low owing to the fact that the transitions $Bi^{202} \rightarrow Pb^{202}$ do not take place, the probabilities of the transformation $Bi^{202} \rightarrow Pb^{202}$ and $Bi^{202} \rightarrow Pb^{202*}$ would have a ratio of 5 : 1. The heads of the LYaP OIYaI are thanked for supplying working facilities on the synchrocyclotron, and I. A. Yutlandov and V. N. Pokrovskiy for assistance. There are 1 figure and 8 references: 6 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: Strominger D., Hollander J. M. Seaborg G. T., Rev. Mod. Phys 30, no. 2, 585 (1958); Hunter E. T., Phys. Rev. 115 no. 4, 1053 (1959).

Card 4/5

34173
S/048/62/026/002/014/032
B106/B108

Products of deep fission ...

ASSOCIATION: Radiyevyy institut im. V. G. Khlopina Akademii nauk SSSR (Radiuminstitute imeni V. G. Khlopin of the Academy of Sciences USSR)

SUBMITTED: September 23, 1961

Fig. Cross sections of the formation of fission products during fission of Bi^{209} by protons.
Legend: (I) E_p = 135 Mev; (II) E_p = 480 Mev (according to A. N. Murin, B. K. Preobrazhenskiy, N. Ye. Titov, Izv. AN SSSR. Ser. khimich., no. 4, 578 (1955)); (III) E_p = 660 Mev (according to A. V. Kalyamin, A. N. Murin, B. K. Preobrazhenskiy, N. Ye. Titov, Atomnaya energiya, 4, no. 2, 196 (1958)); (1) individual yields in polonium nuclei; (2) individual yields of bismuth nuclei; ordinate: σ, mb.

Card 5/6

1

40100

S/048/62/026/008/013/028
B104/B102

24 6600

AUTHORS: Belyayev, B. N., Kalyamin, A. V., and Murin, A. N.

TITLE: α-decay of neutron-deficient Po isotopes

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 8, 1962, 1034 - 1036

TEXT: No direct investigation of the α-decay and E-capture of neutron-deficient Po isotopes which form during the reaction Bi(p, xn)Po is possible because of the complex decay series of Po. By comparing the activities of the isotopes investigated with the corresponding activity of an isotope whose fractions of α-decay and E-capture are known, it is possible however to determine indirectly the fractions of other Po nuclei undergoing α-decay and E-capture. Po^{206} was chosen as reference isotope, of which it is known that $\alpha_1/(\alpha + E) = 5 \pm 1\%$. α_1 is the probability of Po^{206} α-decay to the lowest Pb level, $\alpha + E$ is the total decay probability. The α-activity was measured by an ionization chamber with 31-channel pulse-height analyzer 40 - 50 min after irradiation. The coincidence of the

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lines of Po^{199} (E_α = 5.57 Mev) and Po^{200} (E_α = 5.86 Mev) must be taken into account. It is known for Po^{200} that $\alpha_2/(\alpha_2 + E) = 0.6$, where α_2 is the probability of an α-transition (E_α = 5.77 Mev). Using known data: $\alpha_1/(\alpha_1 + \alpha_2 + E) \approx 5\%$. α_1 is the probability of an α-transition with E_α = 5.86 Mev. The ratio between probability of α-decay to the ground state and total decay probability of Po^{199} is estimated to be ~7%. There is 1 table.

Table. Surface probabilities and reduced widths.
Legend: (1) surface probability, (2) reduced width.

A	E_α, MeV	$\frac{\alpha_1}{\alpha+E}$, %	Поверхностная вероятность (1)	δ^2_L (2)
199	5,87	~7	0,0032	0,06
200	5,86	~5	0,0027	0,042
201	5,67	0,8	0,0015	0,027
203	5,48	0,02	0,00013	0,0024

Card 2/3

MURIN, A. N., doktor khimicheskikh nauk, prof.; PLINER, Yu. G., starshiy nauchnyy sotrudnik

Statistical thermodynamics of simultaneous crystalization processes in some heterogeneous systems. Izv. LETI 59 no.46: 335-336 '62. (MIRA 15:10)

(Crystallization)

L 11053-63 EPF(n)-2/EWT(m)/BDS--AFFTC/ASD/AFWL/SSD--Pu-4--DM

ACCESSION NR: AP3001179 S/0089/63/014/005/0484/0487

67
64

AUTHOR: Dobronravova, A. N.; Levskiy, L. K.; Murin, A. N.; Titov, N. Ye. 19

TITLE: Cross section for formation of krypton and xenon isotopes during uranium fission by protons of 680 Mev energy

SOURCE: Atomnaya energiya, v. 14, no. 5, 1963, 484-487

TOPIC TAGS: krypton, xenon, isotope formation, uranium fission by protons

ABSTRACT: In continuation of the previous work (Geokhimiya, v. 6, 540, 1962) on the relative yield of xenon and krypton isotopes which are fragments of uranium fission by protons of 680 Mev energy, the authors have irradiated two more uranium targets in the inner beam of the synchrocyclotron of the laboratory for nuclear problems of the Consolidated Institute for nuclear studies. After heating the specimens, the gases were collected by activated charcoal at -183C, and, after purification, were analyzed in a MV-23-02 mass spectrometer. To avoid wasting gases, an electric scheme was developed for a speedy tuning for recording each isotope. Description of this scheme is given. The relative yield for the krypton (masses 78 to 86), xenon (124 to 136), and rubidium (83, 84) isotopes is summarized in a table. Effective cross sections are computed using the usual formulas.

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L 11053-63

ACCESSION NR: AP3001179

3

Theoretical estimation is made for the distribution of nuclear fragments as a function of A and Z. "The authors are grateful to V. P. Dzhelepov and E. K. Gerling for their kindness in giving us the opportunity to work with the synchrocyclotron and the MV-23-02 mass spectrometer and also to V. I. Baranovskiy for discussion of results." Orig. art. has: 5 references, 1 figure, 2 tables.

ASSOCIATION: none

SUBMITTED: 27Jul62 DATE ACQD: 21Jun63 ENCL: 00

SUB CODE: 00 NO REF SOV: 003 OTHER: 002

Card 2/2

L 17866-63 EWT(m)/BDS AFFTC/ASD S/0048/63/0027/007/923/926

ACCESSION NR: AP3003697

60
55

AUTHOR: Belyayev, B.I.; Kalyamin, A.V.; Murin, A.N.

TITLE: Excitation functions of nuclear reactions occurring incident to fast proton bombardment of Bi^{209} /Report of the Thirteenth Annual Conference on Nuclear Spectrosopy held in Kiev from 25 January to 2 February 1963/

SOURCE: AN SSSR, Izv.Seriya fizicheskaya, v.27, no.7, 1963, 923-926

TOPIC TAGS: spallation, proton induced reaction, isotope production cross section, Bi^{209}

ABSTRACT: The present work was a continuation of earlier studies (B.I.Belyayev, A.V.Kalyamin and A.N.Murin, Doklady AN SSSR, 140, 337, 1951 and A.V.Kalyamin, A.N. Murin and B.K.Preobrazhenskiy, Izv.AN SSSR,Ser.fiz.,26, 245, 1962) of the yields of spallation of bismuth-209. The present paper gives new and refined data on the cross sections for the formation of the nuclides resulting from bombardment of a bismuth oxide or metallic Bi^{209} with protons having energies from 0.135 to 10 GeV. In all 48 irradiations lasting from 15 min to 4 hours were performed on the synchrocyclotron and proton synchrotron of the Ob"yedinenny*y institut yaderny*kh issledovaniy—OIYaI (Joint Institute for Nuclear Research). The

Card 1/2

L 17866-63
ACCESSION NR: AP3003697

products were separated radiochemically and investigated by means of an ionization chamber, a scintillation gamma-spectrometer and a 4π gamma and Kx radiation detector. The yields are referred to the yield of the $Al^{27}(p,3pn)Na^{24}$ reaction. Values of the cumulative or direct cross sections at five proton energies are tabulated for 46 isotopes of the different elements detected among the reaction products. The results should be a useful guide in selecting the irradiation conditions for maximizing the yield of specific isotopes. The authors are grateful to members of the Laboratoriya yaderny*kh problem (Laboratory of Nuclear Problems), I. A. Yutlandov, V. N. Pokrovskiy and L. Yu. Levenberg, for support and assistance in the work, and to V. N. Mekhedov and V. N. Ry*bakov for their interest and collaboration in carrying out the irradiations on the proton synchrotron. Orig. art. has: 1 table.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 02Aug63 ENCL: 00

SUB CODE: NS NO REF SOV: 007 OTHER: 003

Card 2/2

S/056/63/044/001/002/067
B108/B180

AUTHORS: Belyayev, B. N., Kalyamin, A. V., Murin, A. N.

TITLE: Regularities in the α-decay of nuclei with less than 126 neutrons

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 1, 1963, 10 - 13

TEXT: The ratio $\alpha/(\alpha+E)$ of the probabilities of alpha decay and total decay (alpha decay plus electron capture) for Po^{204} was determined experimentally by comparing the activities with the known ones of Po^{206}. The part of nuclei undergoing alpha decay was measured with an ionization alpha-spectrometer, and the part involved in electron capture was determined from the amount of Bi^{204} daughter nuclei separated chemically from Po. The activity of Bi was measured with a scintillation counter (for more details of the method see Izv. AN SSSR, seriya fiz., 25, 874, 1961). The resulting $\alpha/(\alpha+E)$ ratio is $(0.645 \pm 0.084)\%$. From experimental data on even-even nuclei, the relation $\log T_{1/2}(\alpha) = a/\sqrt{Q_{eff}} + b$ (1) was

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found. It was used to calculate $T_{1/2}(\alpha)$ for the isotopes Po^{196}, 198, 200 and together with experimental data on $T_{1/2}(\alpha+E)$ to calculate the $\alpha/(\alpha+E)$ ratios. The reduced derivative width δ_L^2 has a minimum for N = 126 (S. Axensten, C. M. Olsmats. Ark. Fys., 19, 461, 1961). F, the coefficients of forbiddenness were calculated from the formula $\log F = \log T_{1/2}(\alpha) - (a/\sqrt{Q_{eff}} + b)$ for even-odd Po isotopes. The coefficients a and b were calculated from Eq. (1) for $T_{1/2}(\alpha)$ given in seconds and Q_{eff}, the total energy of alpha decay, given in Mev. The high value of F = 32 for Po^{203} is attributed to its neutron configuration, with only one neutron in the unfilled $f_{5/2}$ subshell. There are 1 figure and 2 tables.

SUBMITTED: June 4, 1962

Card 2/2

ACCESSION NR: AP4028453 S/0181/64/006/004/1208/1212

AUTHORS: Gusev, I. A.; Murin, A. N.

TITLE: Diffusion of zinc in indium antimonide

SOURCE: Fizika tverdogo tela, v. 6, no. 4, 1964, 1208-1212

TOPIC TAGS: solid diffusion, zinc, indium antimonide, semiconductor, dislocation

ABSTRACT: The diffusion of Zn^{65} in single crystals of n-type InSb was studied in the interval 400-500C. Two groups of samples were investigated, having different numbers of dislocations along the axis of growth [111]: one group had $4.6 \cdot 10^5$ cm^{-2} dislocations and a resistivity of 0.04 ohm cm, the other $6.3 \cdot 10^3$ cm^{-2} dislocations and a resistivity of 0.07 ohm cm. Below 450C, when annealing was prolonged, the diffusion coefficient was found to conform to the formula $D = 6.32 \cdot 10^8 \exp\left\{-\frac{2.61}{kT} + 2.47\left(\frac{\rho}{\rho_0} - 1\right)\right\}$. The solubility of zinc in the investigated temperature interval was found to reach a maximum at 445C, where it has a value of $3.5 \cdot 10^{21}$ cm^{-3}. Variations in the number of dislocations did not affect the coefficient of diffusion. "The authors sincerely thank their co-workers at the Institut poluprovodnikov AN

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ACCESSION NR: AP4028453

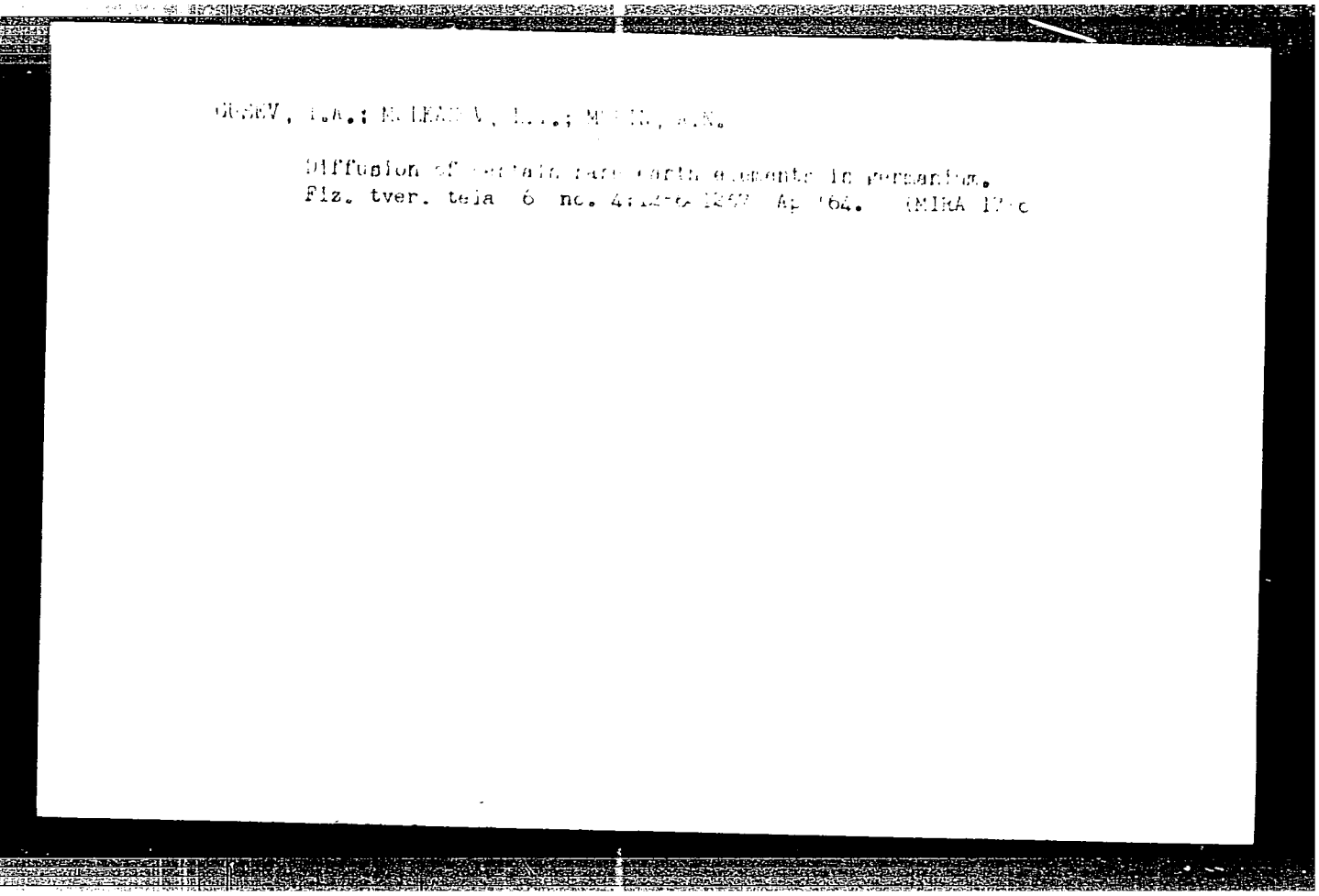
SSSR (Institute of Semiconductors AN SSSR), B. I. Boltaks and A. I. Zaslavskiy, for their valuable remarks and their aid in the work." Orig. art. has: 6 figures, 1 table, and 1 formula.

ASSOCIATION: none

SUBMITTED: 29Jul63 ENCL: 00

SUB CODE: EC, SS NO REF SOV: 000 OTHER: 007

Card 2/2



[illegible], T.A.; [illegible] V., L.A.; [illegible], A.N.

Diffusion of certain rare earth elements in permalloy.
Fiz. tver. tela 6 no. 4:1247-1249 Ap '64. (MIRA 17:6

ACCESSION NR. AP4034952 S/0181/64/006/005/1563/1563

AUTHOR: Gusev, I. A.; Murin, A. N.

TITLE: Diffusion of mercury in indium antimonide

SOURCE: Fizika tverdogo tela, v. 6, no. 5, 1964, 1563

TOPIC TAGS: indium antimonide, n type indium antimonide, single crystal, mercury, tagged mercury, mercury diffusion, diffusion coefficient

ABSTRACT: The diffusion of tagged mercury from the vapor phase into InSb has been studied with n-InSb single-crystal specimens at 425—500C. Experiments were conducted in evacuated ampuls for 4—12 days with specimens in the form of plane-parallel plates (0.8 x 1.2 x 0.25 cm) with strictly parallel faces, cut from the crystals in the direction perpendicular to [111], and etched with the Sr-4A etchant. The diffusion annealing was followed by removal from the side faces of a layer about 100μ thick. The diffusion was studied by removing InSb layers with very fine KZM-14 abrasive paper

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ACCESSION NR. AP4034952

and measuring their activity on a scintillation counter. The dependence of the diffusion coefficient of mercury in InSb on temperature was described by the formula

$$D = 4 \times 10^{-6} \exp\left(-\frac{1.17}{kT}\right) \text{ cm}^2/\text{sec.}$$

Orig. art. has: 1 figure and 1 formula.

ASSOCIATION: none

SUBMITTED: 09Jan64 DATE ACQ: 20May64 ENCL: 00

SUB CODE: CH NO REF SOV: 000 OTHER: 000

Card 2/2

ACCESSION NR: AP4039686 S/0181/64/006/006/1895/1896

AUTHOR: Gusev, I. A.; Murin, A. N.; Seregin, P. P.

TITLE: Diffusion of cadmium into indium antimonide

SOURCE: Fizika tverdogo tela, v. 6, no. 6, 1964, 1895-1896

TOPIC TAGS: cadmium, indium antimonide, tagged cadmium, InSb single crystal, Cd diffusion, Cd diffusion coefficient

ABSTRACT: The diffusion of cadmium into InSb has been studied for Cd^{115m} and plane-parallel InSb specimens (0.9 x 1.2 x 0.25 cm) cut from a single crystal oriented in the [111] direction. Specimen parameters are given. The specimens were etched in a 50% SR-4A etchant solution and annealed in the presence of Cd^{115m} in evacuated ampoules for 48 hr. The diffusion coefficient was determined from the activity of thin specimen layers removed with KZM-14 abrasive paper. The activity was measured with the MST-15 counter. The distribution of Cd in InSb according to

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ACCESSION NR: AP4039686

annealing temperature is shown in Fig. 1 of the Enclosure. The dependence of the diffusion coefficient on temperature was described by

$$D = 1.26 \exp\left(-\frac{1.75}{kT}\right).$$

The activation energy was 1.75 ev. Orig. art. has: 1 figure and 1 formula.

ASSOCIATION: none

SUBMITTED: 10Nov63 DATE ACQ: 19Jun64 ENCL: 01

SUB CODE: PH NO REF SOV: 002 OTHER: 001

Card 2/3

ACCESSION NR: AP4039686

ENCLOSURE: 01

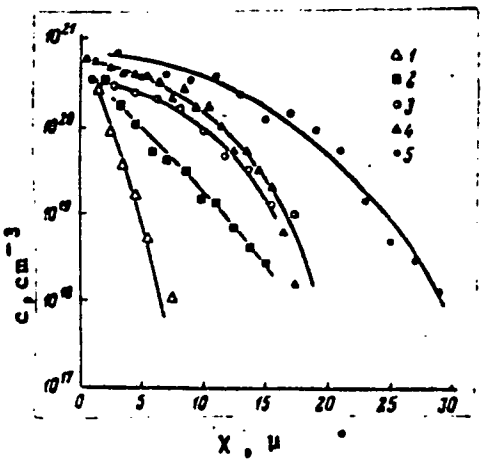


Fig. 1. Penetration curves of Cd^{115m} into InSb single crystals T, °K: 1 - 673, 2 - 698, 3 - 723, 4 - 748, 5 - 773; t = 48 hr.

Card 3/3

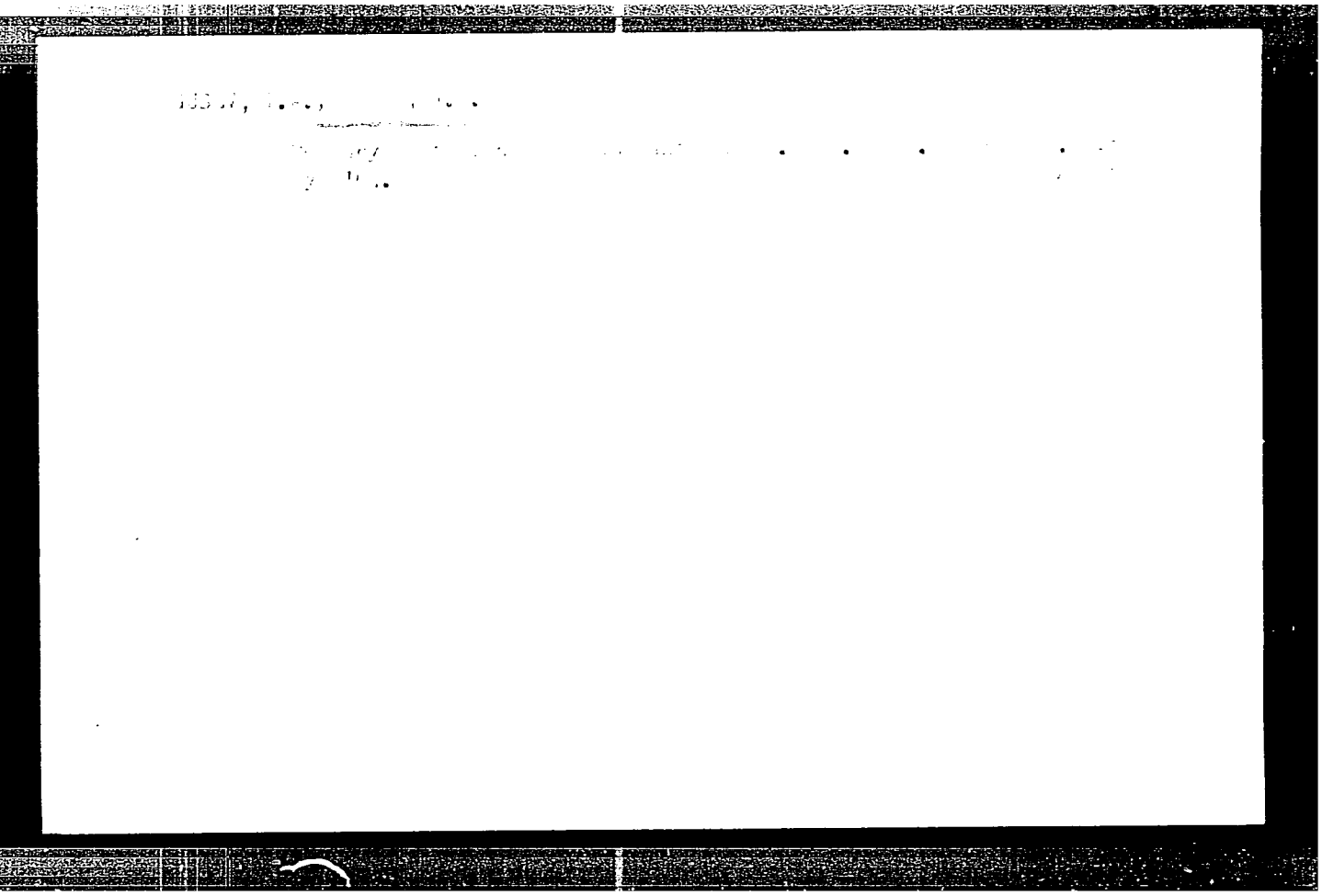
MURIN, A.N.; TOMILOV, S.B.; YUTLANDOV, I.A.

Separation and identification of products obtained in the spallation of germanium with high energy protons. Vest. LGU 19 no.4:105-110 '64. (MIRA 17:3)

MURIN, A.N., BOGDANOV, R.V.; TOMILOV, S.M.

[illegible] effect [illegible] in [illegible]
[illegible] 33 no. 5 [illegible]-647 My '59. (MIRA 12:6)

1. Leningradskiy gosudarstvennyy universitet.



GUSEV, I.A.; MURIN, A.N.; SEREGIN, P.P.

Cadmium diffusion in indium antimonide. Fiz. tver. tela 6 no.6:
1895-1896 Je '64. (MIRA 17:9)